Aeronautical Systems Center

Dominant Air Power: Design For Tomorrow…Deliver Today

U.S. AIR FORCE

Hexavalent Chromium Substitution Projects

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Overview of Presentation

- **Background**
- **Scope of EEV Efforts**
- **Current and Past Projects**
- **Pending Projects**
- **Lessons Learned**
- **Recommendations/Conclusions**

Background

- **RoHS – EU regulations on electronics products**
- **REACH – EU legislation is imposing restrictions on Cr^{6+} use**
- **OSHA PEL reduction to 5 µg/m3 (Feb 2006)**
- **Aerospace Industry Exemption to 25 µg/m3**

USD(ATL) Memorandum

- **Cr^{6+} has international restrictions, which will increase LCC & decrease Cr^{6+} availability**
- **Approve the use of alternatives when they perform adequately**
- **Document Cr^{6+} risks & alternative efforts in PESHE**
- **PEO will certify Cr^{6+} on new systems & legacy system modifications/updated maintenance procedures if no alt. exists**

PEO Certification Details

- **Cost effectiveness of alternatives vs. Cr^{6+}**
- **Technical feasibility of alternatives**
- **ESOH Risk of alternatives vs. Cr^{6+}**
- **MRL of at least 8 for alternatives**
- **Materiel availability of alternatives vs. Cr^{6+}**
- **Corrosion performance differences as defined by service SMEs (AFCPCO & CTIO)**

Scope of EEV Cr^{6+} Efforts

- **3010/3020 Funding – directly support the production of aircraft and missiles**
- **Our Cr^{6+} efforts are on:**
  - **Corrosion Control of aircraft surfaces (Pretreatments, Primers and Coatings)**
  - **Corrosion Control of fasteners**
  - **Fuel tanks**
  - **Sealants**

Other Cr^{6+} Alternatives Efforts

- **AFRL/RXSSO (Coating Technology Integrated Office)**
- **Depots and AF Corrosion Prevention and Control Office, Robins AFB**
- **PEWG, Tinker AFB**
- **Other services such as NAVAIR, Army Aviation and Coast Guard**
- **Academia**
- **Commercial**

Status of Cr^{6+} on Some of the USAF Legacy Systems

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- **Non-Cr Primer and Non-Cr Surface Treatments:**
  - **AETC (T-38) Non Cr Primer & Non Cr Surface Treatment**
  - **WR-ALC (F-15)**
  - **ACC (F-16) Planned Mg Rich Primer & Non Cr Surface Treatment**
  - **F-35**
- **Non-Cr Surface Treatment (Prekote) and Cr Primer**
  - **OO-ALC (C-130, F-16, A-10)**
  - **AETC (T-6, T-38 and T1A)**
- **Both Cr Primers & Non-Cr primers as well as Cr Surface Treatment**
  - **F-22**

Current and Past EEV Cr^{6+} Efforts

- **Low-Chrome Conversion Coating and NC Primer for C-130J OML**
- **Non-chrome primer – C130J Inner Mold**
- **Barrier coat for F-16**
- **Non-chromated, Low VOC Qualification of Fuel Tank Coating per Mil Spec AMS-C-27725**
- **Mg Rich Treatment**

Future EEV Cr^{6+} Projects

- **Evaluate and Validate Non-chrome conversion coating for Aircraft Touch-up applications**
- **Evaluate and Validate Non-chrome conversion coating for Immersion applications**
- **Next Generation Mg Rich Treatment**
- **Evaluate and Validate Non-Threaded Fastener for wet sealant Corrosion Protection**

Lessons Learned

- **Our projects are based on data calls to GOCO facilities & ASC Program Offices**
- **Our Projects benefit is on production with ancillary impacts at the Depots**
- **Our projects' emphasis is environmental compliance**
- **Each weapon system requires Qual & Testing of the alternative on their system**
- **OEM "process" change – requires Qual Testing & OEM Spec changes**

Lessons Learned Cont'd

- **Need to insert all Cr^{6+} related projects into DoD ASETSdefense database**
  - **Our plan is to provide summary of each of our Cr^{6+} projects**
- **Depend on AFRL, Academia & Commercial entities to mature technologies**
  - **Use ASETSdefense for DoD and Commercial applications**
  - **DTIC for DoD-related efforts**

Recommendations/Conclusions

- **Need to collaborate with others (e.g., AFRL, OEMs and depots) for future projects to avoid duplication of effort**
- **Some Cr^{6+} will be continued to be used:**
  - **Unless the alternatives are equal in corrosion control, have less LCC, are available and have less ESOH risk (as defined by MIL STD 882D)**
  - **Unless Cr^{6+} becomes no longer available due to increasing international & US regulations**